PATENT SPECIFICATION

DRAWINGS ATTACHED

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893,869

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International Classification:—**E21b, d.**

COMPLETE SPECIFICATION

Improvements in or relating to Wells.

We, RANNEY METHOD INTERNATIONAL, INC. a Corporation organized under the Laws of the State of Ohio, United States of America, of 2015 J. Street, Sacramento, California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to wells, particularly water wells and is especially concerned with water wells of the type in which horizontal pipes extend outwardly from a caisson into a water bearing stratum so that water infiltrates by gravity or natural flow into the caisson whence it is pumped to a point of use.

In connection with wells of the horizontal type such as referred to above, the formation of the sand and gravel bed around the infiltration pipe, known as the aquifer, is important in order to insure an adequate supply of water to the infiltration pipes that is free of fine sand and silt. In many cases it is possible to develop such an aquifer from the earth in the region of the infiltration pipe where the stratum into which the pipe extends consists of sand and gravel of the proper consistency. In other cases, the nature of the earth about the infiltration pipe is such that no satisfactory filtration bed about the pipe can be formed from the materials in the earth.

In still other cases, the infiltration pipe may project into or through a body of water and in this case no aquifer can be formed from the material about the pipe and no filtration of the water can be obtained.

The present invention provides a well comprising a caisson sunk into the ground and an infiltration pipe extending laterally of the caisson through the wall thereof, said infiltration pipe comprising a perforated pipe and layers of filtering material surrounding and supported by the perforated pipe whereby the filtering material is installed as the infiltration pipe is installed.

The invention will now be particularly described with reference to the accompanying drawings in which:—

Figure 1 is a diagrammatical sectional view showing an installed horizontal well;

Figure 2 is a sectional view at somewhat enlarged scale along one of the infiltration pipes with the pipe broken away;

Figure 3 is a sectional view through a portion of an infiltration pipe showing the sections of the pipe coupled together and showing the pre-constructed filter beds surrounding the pipe;

Figure 4 is a cross-sectional view indicated by line 4-4 on Figure 3 and drawn at enlarged scale showing the appearance of a section of the infiltration pipe in section;

Figure 5 is a view showing the blank pipe in which the infiltration pipe is to be placed in the act of being pushed into the earth; and

Figure 6 is a sectional view showing a step in connection with the installation of the well demonstrating the manner in which the aquifer is developed as the blank pipe is withdrawn into the caisson.

Referring to the drawings somewhat more in detail, Figure 1 shows a horizontal well installation according to the present invention and which installation will be seen to comprise a concrete caisson 10 sunk vertically downwardly into the ground to a suitable depth where the infiltration pipes 12 will extend into the earth in a region where there will be a copious supply of water thereto by gravity flow.

The infiltration pipes 12 extend horizontally through port holes in the wall of the caisson and there may be several of these pipes which may extend out for distances up to 200 or 300 feet.

[*Price 4s. 6d.*]

Each of the infiltration pipes 12 has a valve 14 at its inner end which may be controlled from an operating platform in an upper portion of the caisson so that one or more of the valves can be closed if so desired.

The water which flows into the caisson through the infiltration pipes collects in the caisson and is pumped therefrom as by the multi-stage pump 16 adapted for being driven by the motor means 18 located in the control house 20 at the upper end of the caisson.

The present invention is concerned primarily with the nature of the infiltration pipes 12 and the method and apparatus for installing these pipes. Reference to Figures 2, 3 and 4 will show that the infiltration pipes 12 consist of a plurality of individual units 22 each of which has a perforated inner pipe 24 that is surrounded in radially spaced relation by a first screen 26 and which screen is, in turn, surrounded by a second screen radially spaced therefrom as at 28. The ends of the screens are supported by and may be connected to end members 30 fixed to perforated pipe 24 adjacent the opposite ends thereof. Located inside the first screen 26 is a coarse bed 32 and between the screens 26 and 28 is a fine bed 34.

The particular infiltration pipe unit 22 referred to and generally described above is disclosed in more detail in U.S. Patent No. 1,992,718. In this patent the formation of the filter layers about the perforated pipe is explained in detail and it is pointed out that the preferred way is to have the filtering media cemented in place in order to prevent shifting of the material of the filtering media during transportation or handling. It will be understood, however, that it is not essential for the material to be permanently fixed in place since it will remain permanently in position without any cement after the pipes have been installed in the ground. As examples of the material that advantageously can be employed in the filtering media, I prefer a coarse aggregate of about 6 British Standard mesh for the inner layer and a finer material of about 9 mesh for the outer layer. It is preferred for the layers to be about 3 inches thick and the perforated pipe may be 6 to 8 inches in diameter and may be from 4 to 6 or 8 feet in length. As will be seen in Figure 3 the perforated pipes have their opposite ends threaded as at 36 so that adjacent of the infiltration units can be connected together by coupling means 38 as the pipes are being installed.

When the installation of the pipe is completed the infiltration pipe terminates in the region of the wall of the caisson as will be seen in Figure 2 and preferably has connected to the inner end thereof a short length of pipe 40 to which is connected one of valves 14 previously referred to. The infiltration pipe is preferably sealed as by seal ring 42 inside a short length of blank pipe 44 which, in turn, is sealed as by the rubber-like sealing sleeve 46 inside the tubular element 48 that is mounted in the cement 50 in port hole 52 in the wall of caisson 10. It will be evident that the arrangement provides for complete control of the flow of water through the infiltration pipe by valve 14.

As to the manner of installing the infiltration pipes, this is accomplished in a simple manner merely by pushing blank pipes 54 outwardly through the port holes as illustrated in Figure 5. These blank pipes are provided with detachable drilling heads 56 which remain in the ground after the blank pipes have been pulled out. The blank pipes are pushed outwardly into the ground as far as has been predetermined by the geological survey made prior to commencing the installation of the well. When the pipes have been pushed outwardly the desired distances, the units of the infiltration pipe are placed within the blank pipe by being connected one by one within the caisson while pushing the infiltration pipe outwardly with the blank pipe. The first section of the infiltration pipe at its extreme outermost end is preferably provided with a cap 58 to prevent water from entering the pipe without being filtered.

After the infiltration pipe has been placed within the blank pipe, the sealing coupling 60 may be put in place at the inner end of the blank pipe thus sealing at the inner end of the blank pipe so that it can be withdrawn without flooding the caisson.

The blank pipe 54 is then drawn inwardly into the caisson and is cut off in lengths and removed until the short section thereof indicated at 44 in Figure 2 is in its Figure 2 position and which element forms a part of the completed structure.

During withdrawal of the blank pipe however, the earth around the infiltration pipe may be treated to develop a still larger filtering bed than is provided by the filtering beds integral with the infiltration pipe units. and also to remove sand and fines from the region about the infiltration pipe. This may be accomplished by periodically or continously supplying water to the inside of the infiltration pipe, preferably to restricted or limited regions therealong and permitting this water together with the sand and fines which it picks up from the earth surrounding the infiltration pipe to flow into the blank pipe and thence through the blank pipe around the infiltration pipe and into the caisson. The water is then pumped out of the caisson to a point of discharge.

For supplying water to the inside of the

infiltration pipe there may be provided a pipe 62 which has at its outer end spaced sealing rings 64 whereby it sealingly engages the inside of the infiltration pipe. Extending between the seals 64 and in communication with pipe 62 is a perforated sleeve 66 through which water delivered to pipe 62 under pressure passes so that it will flow radially outwardly through the infiltration pipe into the surrounding area and then flow into the end of the blank pipe as indicated by arrows 68 and thence into the caisson as indicated by arows 70 and 72.

By gradually withdrawing the blank pipe 54 and by manipulating the flushing unit referred to above endwise of the filtration pipe inside the blank pipe, the region surrounding the infiltration pipe can be developed to a high degree of perfection in any case where such development is desirable.

The methods and apparatus and the resulting horizontal well structure according to the present invention provides for the creation of predetermined conditions under any circumstances that it is desired to install a collector. The nature of the earth bearing the water which it is desired to use does not prevent the installing of a filter bed having precisely predetermined characteristics.

The installation of a horizontal well is considerably simplified since only a single blank pipe is positioned instead of a perforated pipe which would be somewhat weaker than a blank pipe or a predetermined filter carrying pipe which would be extremely difficult to position. The prefabrication of the filtering units can be accomplished in a shop and when delivered to the job site these units will be ready for installation without requiring any skilled labor.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

WHAT WE CLAIM IS:—

1. A well comprising a caisson sunk into the ground and an infiltration pipe extending laterally of the caisson through the wall thereof, said infiltration pipe comprising a perforated pipe and layers of filtering material surrounding and supported by the perforated pipe whereby the filtering material is installed as the infiltration pipe is installed.

2. A well according to claim 1 wherein said infiltration pipe comprises cylindrical screen members surrounding the perforated pipe in radially spaced relation to the pipe and to each other, said filtering material being located between the pipe and the screen next adjacent thereto, and also between the screens.

3. A well according to claim 1 or claim 2 wherein said infiltration pipe comprises two or more pipe sections connected in end-to-end relationship.

4. A well comprising a caisson sunk into the ground, and an infiltration pipe extending through the wall of the caisson horizontally into a water bearing stratum, said infiltration pipe comprising a plurality of sections connected end to end, each said section comprising a perforated pipe, a first screen surrounding the perforated pipe in radially spaced relation, a filtering material between the first screen and the perforated pipe, a second screen surrounding the first screen in radially spaced relation and a filtering material in the space between said screens, and members secured to the perforated pipe adjacent the ends thereof and abutting the screens to retain the filtering material in place.

5. A well according to claim 4 wherein the filtering material between the screens is of finer mesh than the filtering material inside said first screen.

6. A well according to any preceding claim having a short length of blank pipe sealed in a port hole in the wall of said caisson, said infiltration pipe extending outwardly from the caisson through the blank pipe, and a seal between the inner end of said infiltration pipe and said blank pipe so that water can enter the caisson only through the infiltration pipe.

7. A well according to any preceding claim wherein a valve is mounted on the inner end of said infiltration pipe for controlling communication of the infiltration pipe with the caisson.

8. A well according to claim 6 having means in the infiltration pipe for supplying water therethrough to limited regions of surrounding earth, the arrangement being such that said water returns to the caisson through said blank pipe.

9. A well according to claim 8 wherein the said means for supplying water through the infiltration pipe comprises a pipe extending axially into the infiltration pipe and having sealing engagement therewith at spaced points, and apertures in the said pipe between the said points of sealing engagement thereof with the infiltration pipe.

10. A well substantially as herein described with reference to the accompanying drawings.

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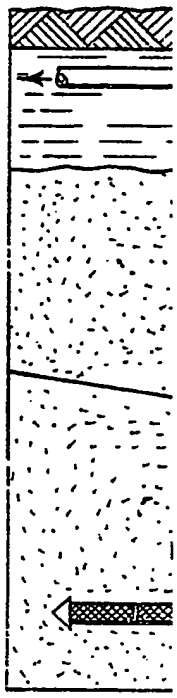
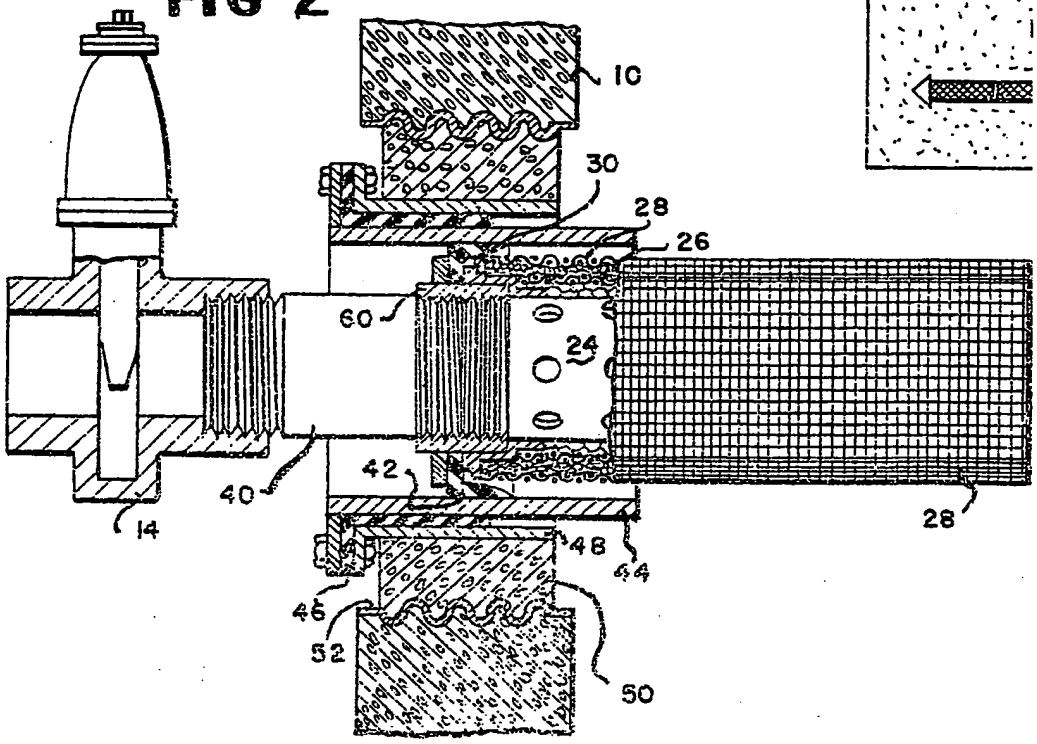
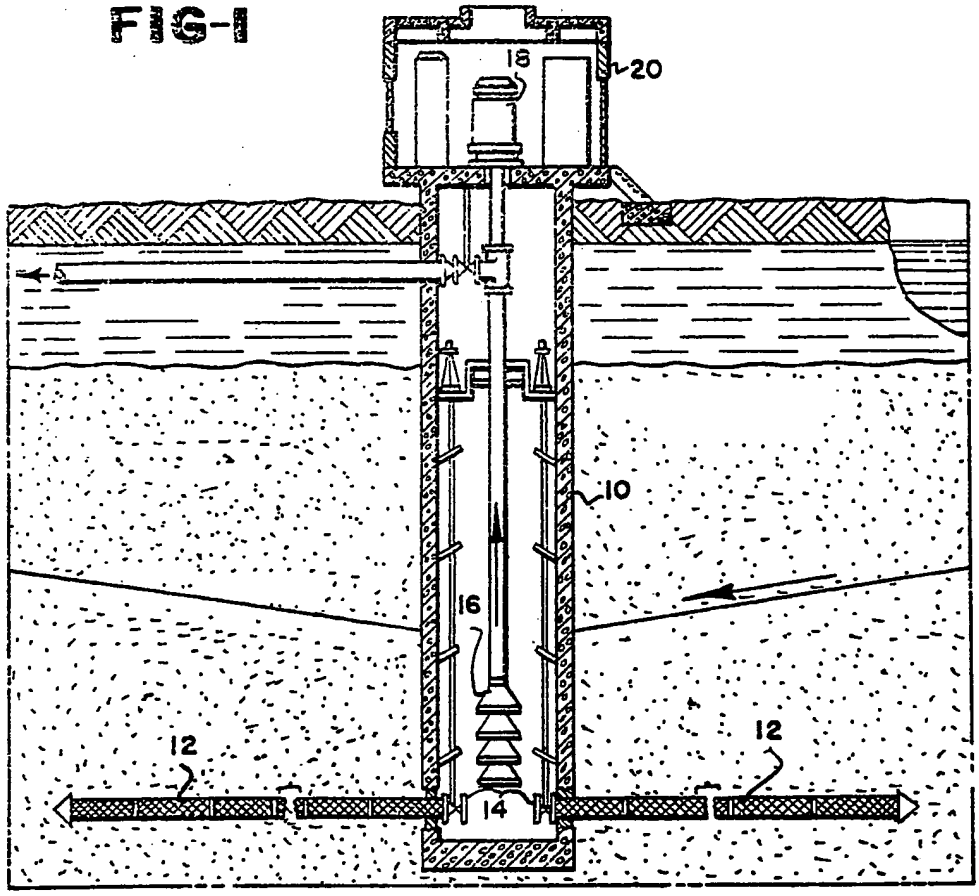


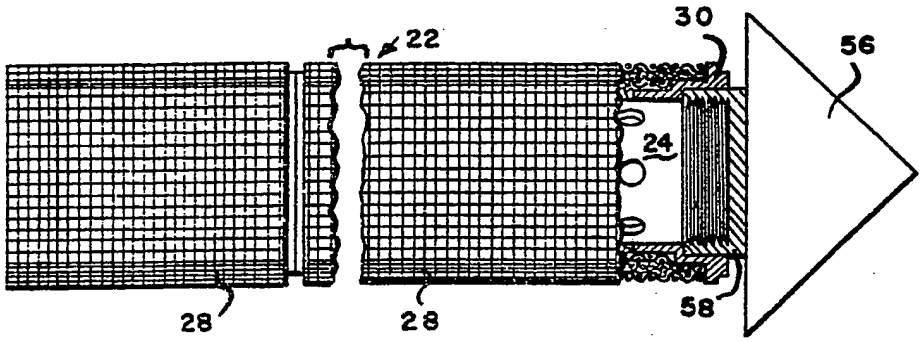
FIG-2



893,869 COMPLETE SPECIFICATION
2 SHEETS

FIG-1





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COMPLETE SPECIFICATION

FIG-1

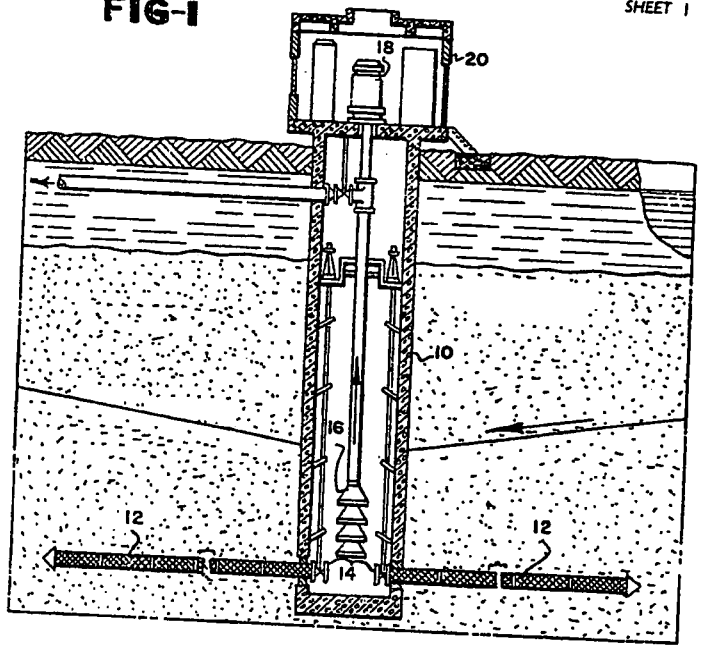

FIG-2

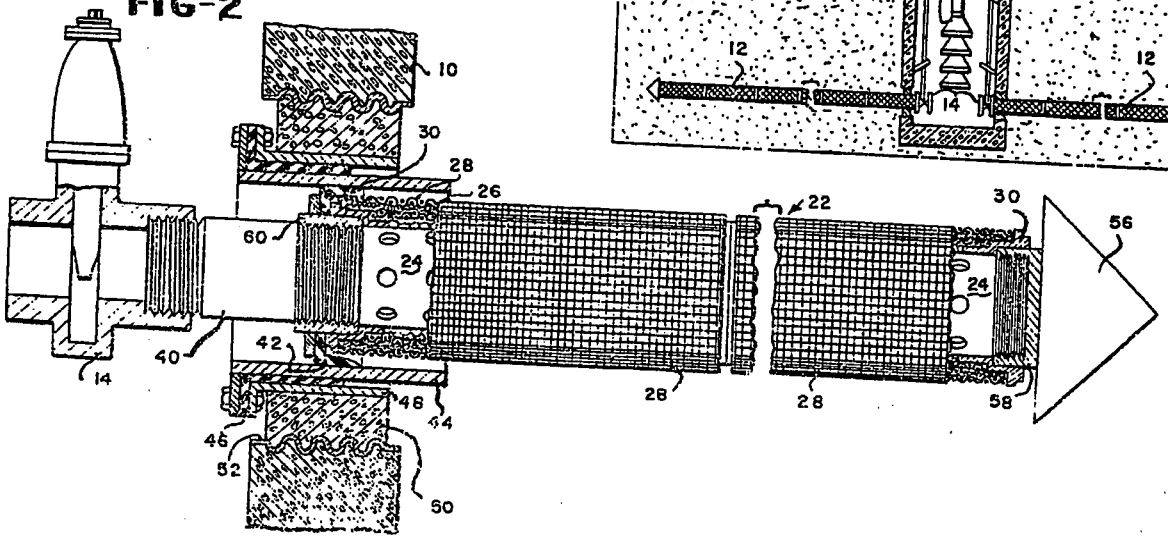

FIG-3

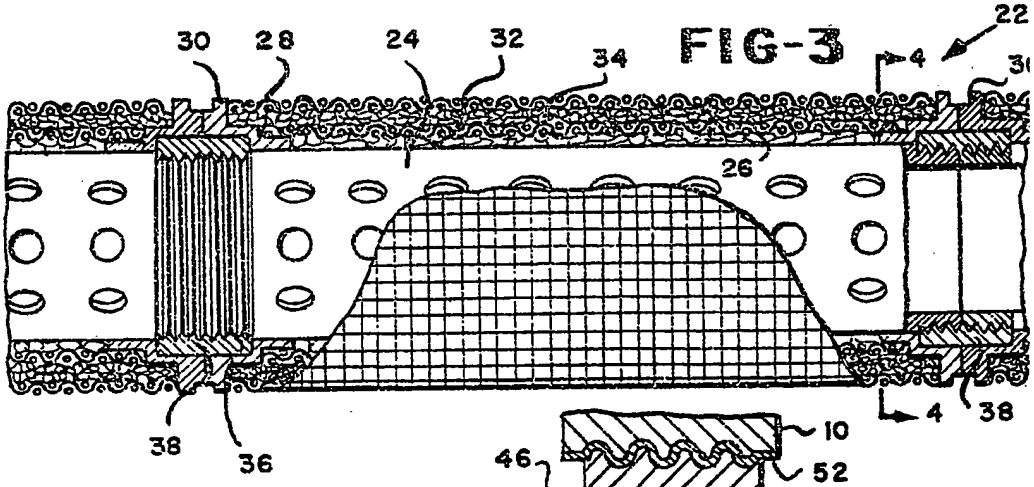
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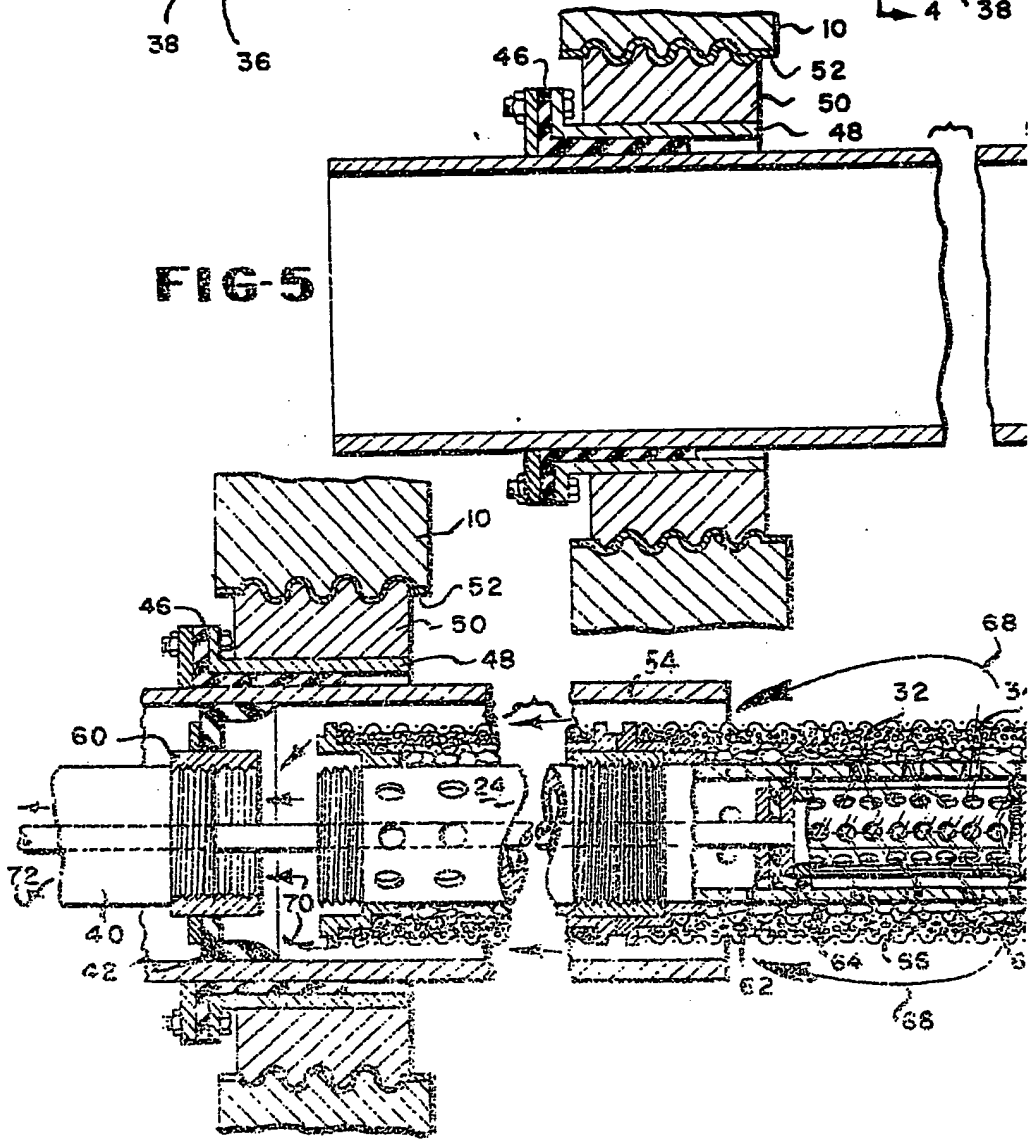
FIG-5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893,869 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 2

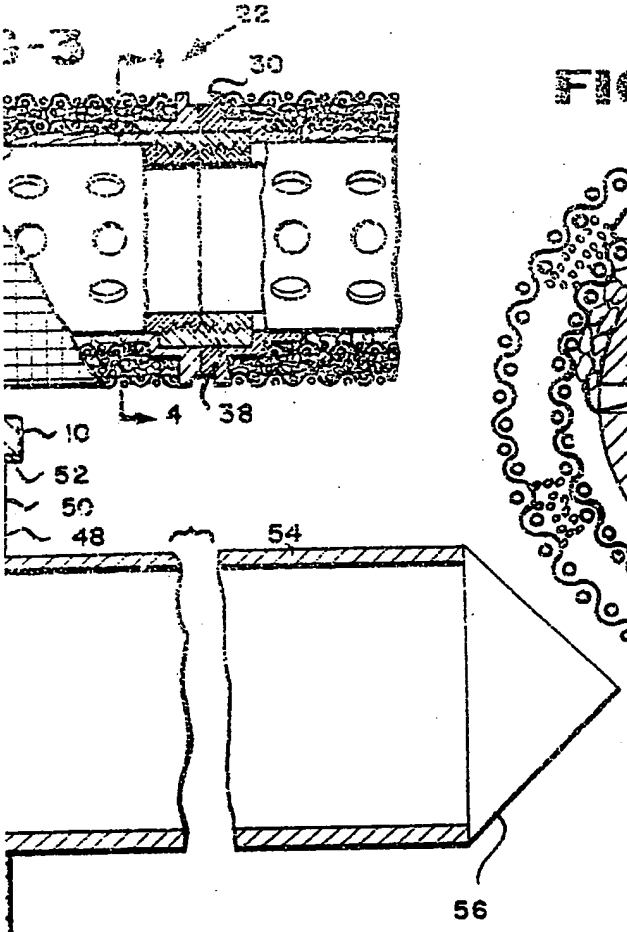


FIG-4

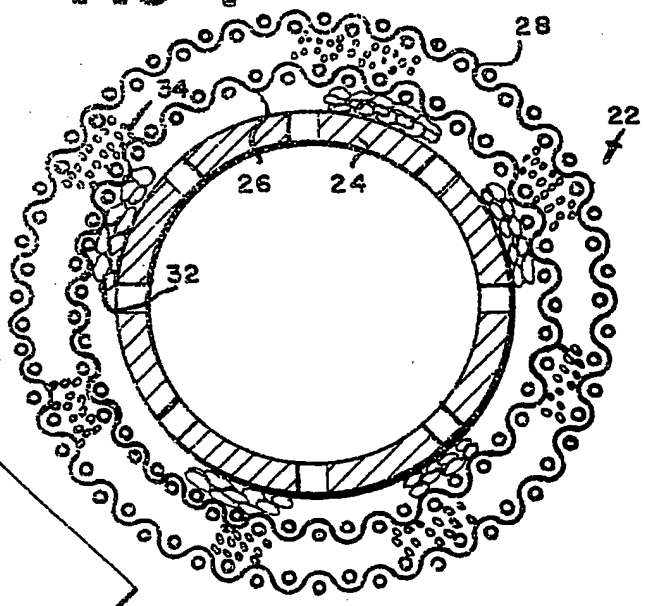
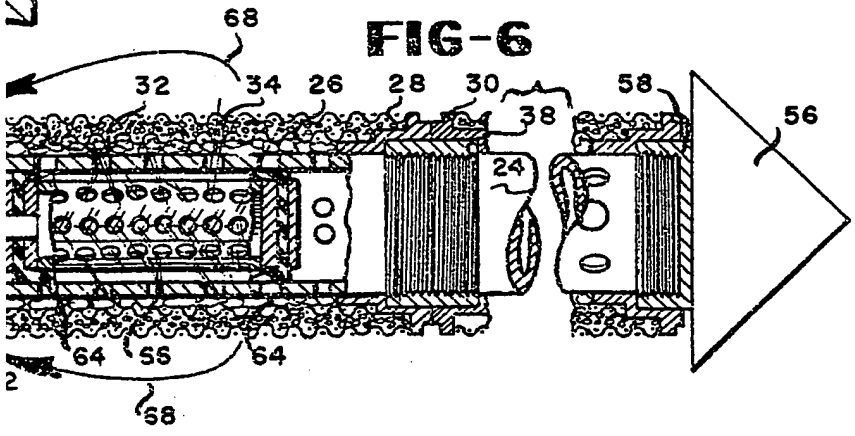


FIG-6



893,869 COMPLETE SPECIFICATION
2 SHEETS

FIG-3

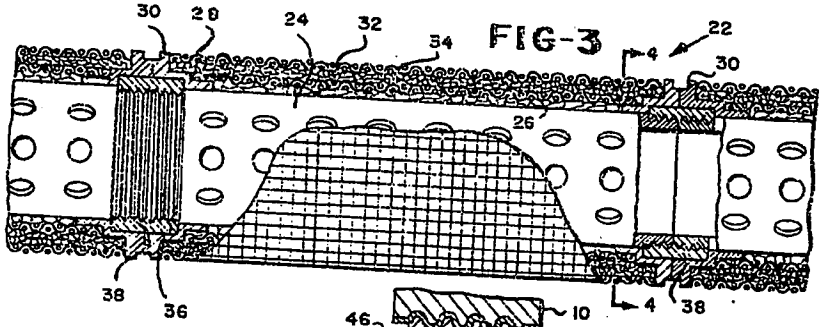


FIG-4

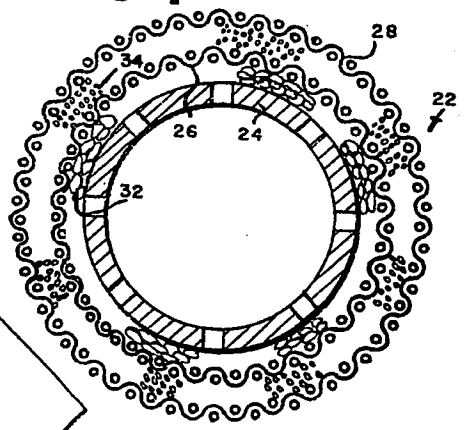


FIG-5

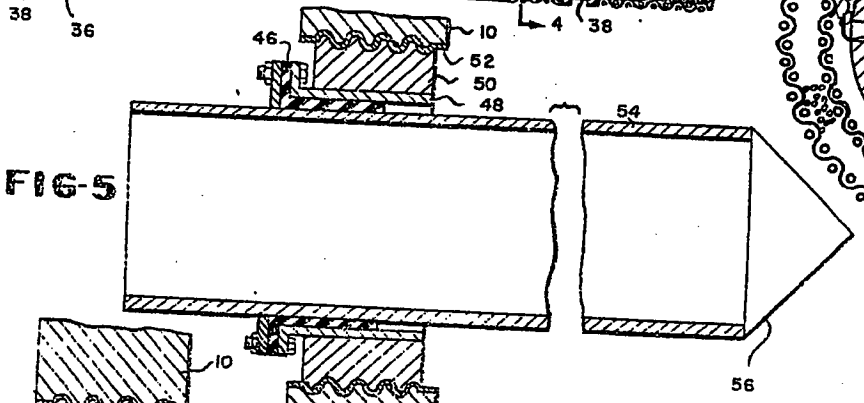


FIG-6